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ABSTRACT

This document is part of a series of reports of a Statewide Evaluation Study of the Tech-Prep Program in New York State. The Pairs Study involved analysis of Tech-Prep vs. non-Tech-Prep student performance using 14 pairs of institutions - one college and its feeder high school. Research utilized high school and college transcripts for 391 students who had enrolled in the college that was paired with the high school from which they graduated. While the Tech-Prep group showed significantly higher cumulative high school averages, the difference was small, indicating that the effects of Tech-Prep were just beginning to materialize and that the sample groups were substantially equal in high school performance. About two-thirds of Tech-prep students were minority, as compared to one-third of non-Tech-Prep students, largely because of the significantly higher proportion of urban students in the former group. Tech-Prep students persisted more than their non-Tech-Prep peers, and the total sample of Tech-Prep students had significantly higher mean first semester grade point averages than the non-Tech-Prep students. Tech-Prep college students were more likely to enroll in career college curricula, and in more demanding curricula, choosing more rigorous "Engineering-Related" and "Health-Related" curricula. Tables 1-10 indicate: (1) high school outcomes; (2) distribution of study samples among Tech-Prep and non-Tech-Prep groups; (3) student demographics, (4) mean grade point average and status of students with various diploma types; and (5) statistical significance of selected variables. (AS)

THE COLLEGE PAIRS STUDY

EVALUATION OF TECH-PREP IN NEW YORK STATE

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This research was supported by a VATEA Grant from the New York State Education Department Bureau of HEOPS, VATEA, & Scholarships Project No. 8080-99-0082

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This document is part of a series of reports of a Statewide Evaluation Study of the Tech-Prep Program in New York State. The series includes the following reports:

EVALUATION OF TECH-PREP IN NEW YORK STATE
FINAL REPORT[1]

EVALUATION OF TECH-PREP IN NEW YORK STATE
CONDENSED FINAL REPORT[2]

EVALUATION OF TECH-PREP IN NEW YORK STATE
FINAL REPORT -- EXECUTIVE SUMMARY [2]

EXEMPLARY PRACTICES IN TECH-PREP
IN NEW YORK STATE[2]

BEST PRACTICES IN TECH-PREP IN NEW YORK STATE
EXCERPTED FROM FINAL REPORT[2]

STATEWIDE SURVEYS AND INTERVIEWS
EVALUATION OF TECH-PREP
EXCERPTED FROM FINAL REPORT[2,3]

THE PAIRS STUDY -- EVALUATION OF TECH-PREP
EXCERPTED FROM FINAL REPORT[2]

PRELIMINARY STUDY OF ASSOCIATE DEGREE TECH-PREP GRADATES[2]

THE COLLEGE PAIRS STUDY -- EVALUATION OF TECH-PREP[2]

Availability of Reports:

[1] On the web at http://www.nysed.gov/workforce/tech.html Also in the ERIC system (ED 412355); ERIC abstract in Research in Education, March 1998..

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TABLE OF CONTENTS

LIST OF TABLES

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Stan Brodsky & Carmen Arroyo

THE COLLEGE PAIRS STUDY

EVALUATION OF TECH-PREP IN NEW YORK STATE

INTRODUCTION & BACKGROUND

The Tech-Prep program was introduced into legislation as a bill presented by William Ford of Michigan entitled Tech-Prep which was integrated as a separate section into the new Carl D. Perkins Vocational & Applied Technology Education Act (VATEA) of 1990. Five years earlier, Dale Parnell's The Neglected Majority focussed attention on the middle 50 percent of high school students who do not prepare for or pursue a bachelor's degree and leave high school unprepared for the modern workforce. He proposed integrating the 11th through 14th years of education in occupationally-oriented technical curricula which provide for upward mobile jobs.

The Perkins legislation was recently reauthorized as the VATEA of 1998 continuing Tech-Prep as an important and independent component. This new legislation has broadened the scope of the secondary-post-secondary relationship to permit consortia to begin Tech-Prep at earlier grades and/or extend it to include 4-year colleges. The focus continues to emphasize academic rigor as well as contextual and applied curricula using real-world experiences and work-based learning in conjunction with business and industry leading to an associate degree or post-secondary certificate in a career field and placement in related employment or continuing higher education, or both.

New York State inaugurated Tech-Prep consortia in the 1991-1992 academic year, the first year that federal funding was available for Tech-Prep. From that point to 1993-1994 a total of 30 Tech-Prep consortia were established in the State, all of which continue to function. Many have expanded their student enrollment base by adding new curricular areas or new secondary schools. Further expansion is anticipated and has been made an important criterion for competitive funding.

In addition to the Tech-Prep consortia, two Tech-Prep Technical Assistance Centers have been created to help coordinate the work of the consortia, provide timely information and referrals, assist in organizing conferences and workshops for staff development, arrange for periodic networking meetings of consortia personnel, provide a clearinghouse for national, regional and locally developed Tech-Prep and related School-to-Work published materials, and generally serve as resources for consortia personnel. One Technical Assistance Center (TAC) is administered by the Two-Year College Development Center (TYCDC) at the State University of New York (SUNY) at Albany. Another TAC is located at the Center for Advanced Study in Education (CASE) at the City University of New York (CUNY) Graduate School. The New York State Education Department has a cohesive arrangement between its secondary and post-secondary professionals who oversee the entire Tech-Prep, VATEA and workforce development efforts.

In 1996, the New York State Education Department requested the two Tech-Prep TAC's to design and conduct evaluation studies of the Tech-Prep programs in the State since their inception. The TAC at the TYCDC and the Evaluation Consortium, both of SUNY Albany, conducted on-site interviews and surveys of stakeholders and others at all 30 Tech-Prep consortia. The TAC at the CASE/CUNY Graduate School gathered written descriptions of "Best Practices" in Tech-Prep submitted by 28 of the 30 consortia. In addition, a controlled study of Tech-Prep vs. non-Tech-Prep student performance was conducted using 15 pairs of institutions -- one college and one feeder high school in the same consortium constituted a pair. This research, which was called "The Pairs Study," involved analysis of detailed records, mainly from high school and college transcripts for 1,854 students -- 1,050 Tech-Prep students and 804 non-Tech-Prep students from the same institutions, classes and years.

The results of these evaluation studies have been published in "Evaluation of Tech-Prep in New York State -- Final Report."* Several sections of this report have been published separately. See the inside of the front cover for a list of these publications.

Of the 15 consortia participating in "The Pairs Study," 14 provided information for the present research, "The College Pairs Study." This current study relied on the data base of student subjects developed in the earlier study and included those who were attending, had attended or had graduated from the 14 paired colleges. The 14 Tech-Prep consortia were identified as predominately serving five rural, six urban, and three suburban communities.

VALIDATING THE COLLEGE PAIRS SAMPLE

In the previous Pairs Study in 1997, analyses of high school records of Tech-Prep and comparable non-Tech-Prep students indicated that Tech-Prep students were likely to attain higher 11th and 12th grade averages, had fewer academic absences, and were more likely to obtain a New York Regents diploma than their non-Tech-Prep peers. In addition, Tech-Prep appeared to have more of a positive impact on local diploma graduates than on Regents (see p. 11) diploma students. The findings presented in this report were derived from a follow-up of approximately 21% (391) of the students included in the 1997 study database who have attended the 14 paired colleges.

To ascertain that the students included in the 1999 sample were statistically equivalent to those in the prior 1997 study, data analysis procedures used for the 1997 data were applied to the 1999 sample. Specifically, a series of multiple regressions was used to investigate whether the unique contribution of Tech-Prep to 1999 student outcomes replicated those found in 1997. Separate analyses were conducted on the outcome variables previously investigated: (a) high school averages in the 11th and 12th grade; (b) cumulative high school averages; (c) number of absences during the 11th and 12th grades; and (d) scores obtained on a variety of statewide and national examinations including the New York State Sequential Math I, Sequential Math II, Earth Science, and Biology Regents Exams, and the verbal and mathematics sections of the PSAT and Scholastic Aptitude Test (SAT). Results of the 1997 and 1999 analyses are presented in Table 1.

* "Evaluation of Tech-Prep in New York State -- Final Report." S. M. Brodsky, D. L. Newman, C. G. Arroyo, & J. M. Fabozzi. October 1997. 257 pp. This document is in the ERIC system (ED 412355). An abstract appears in ERIC's Research in Education, March 1998. It is also on the web at http://www.nysed.gov/workforce/tech.html.

As indicated in Table 1, within the 1999 sample, Tech-Prep made statistically significant contributions to students' high school averages and the number of absences during the 11th and 12th grades. These results mirror those found with the 1997 sample. The parity in results leads us to conclude that the 1999 sample is representative of the total sample used in the 1997 analyses. Furthermore, the two groups in the current sample were statistically equated using 9th and 10th grade averages. Thus, while there is a signficant difference in cumulative high school averages, that difference is only half a point, indicating that the effects of Tech-Prep are just beginning to materialize and that the 1999 sample groups are substantially equal in high school performance.

TABLE 1

EFFECTS OF TECH-PREP PROGRAM ON HIGH SCHOOL OUTCOMES

	1997 Student Data (N = 1854)		1999 Student Data (N = 391)	
Outcome Variable	Regression Coefficient	Significance Level	Regression Coefficient	Significance Level
11th Grade HS Average	.82	.04*	.81	.01*
12th Grade HS Average	.52	.04*	.80	.04*
Cumulative HS Average	.79	.04*	.52	.01*
Absences During Grades 11 & 12	-8.14	.00*	-8.28	.00*
Sequential Math I Regents Score	.31	.74	.35	.71
Sequential Math II Regents Score	-2.19	.04*	-2.32	.03*
Earth Science Regents Score	.37	.65	.41	.61
Biology Regents Score	-.06	.94	.07	.93
PSAT Verbal Score	-2.57	.67	-2.00	.73
PSAT Math Score	-.91	.83	-.52	.90
SAT Verbal Score	-4.61	.74	-.51	.97
SAT Math Score	-15.64	.22	-14.01	.27

* Indicates statistical significance at the .05 level or better

THE COLLEGE PAIRS STUDY

Liaisons at the 14 participating Tech-Prep consortia were given lists of student ID numbers for all Tech-Prep and non-Tech-Prep students who were in the 1997 database and asked to provide college transcripts as of February 1998 for those who attended the paired colleges in their consortia. In addition, final high school transcripts were requested for new paired college registrants who had not completed high school at the time of the 1997 study.

The college transcripts for this sample of students were reviewed and information regarding college status, involvement in remedial English and math, academic curriculum major, and semester grade point averages was recorded and entered into a new database. The cumulative GPA at graduation and the degree attained were also recorded for graduates.

College Pairs Study Sample

Table 2 shows the distribution of the 1999 College Pairs Study sample by environmental area. The samples of both the Tech-Prep and non-Tech-Prep groups are heavily weighted by the larger enrollments in the urban consortia high schools which participated in the initial study. The college Tech-Prep group represents 24% (255 of 1,050) of the Tech-Prep data base compared to only 17% (136 of 804) of the non-Tech-Prep data base. Thus, there was a significant difference between urban and non-urban Tech-Prep and non Tech-Prep student groups ($\chi^2 = 3.93$; $p < .05$).

TABLE 2

DISTRIBUTION OF 1999 STUDY SAMPLE BY ENVIRONMENTAL AREAS

Environmental Area	Tech-Prep Students	Non-Tech-Prep Students	Total Students
5 Rural Consortia	32 (13%)	28 (21%)	60 (15%)
6 Urban Consortia	202 (79%)	95 (70%)	297 (76%)
3 Suburban Consortia	21 (8%)	13 (10%)	34 (9%)
Total 14 Consortia	255 (100%)	136 (100%)	391 (100%)

In the previous document, "The Pairs Study." data were presented separately for local diploma and Regents diploma recipients. In the current analyses, however, results are presented first for all students followed by results for each of the two diploma type groups. Because of the small number of Regents graduates included in this study, caution should be taken in interpreting the results obtained with this group of students.

Demographic Characteristics of Study Participants

Table 3 shows several demographic variables for both groups in the college study. The proportions of the two sub-groups were almost identical on gender with about one-fifth more males than females. Ethnic minority student proportions, however were significantly different between the Tech-Prep and non-Tech-Prep college groups ($\chi^2 = 24.01$, $p < .01$). While the Tech-Prep students were approximately two-thirds minorities, the non-Tech-Prep peers ethnic proportions were reversed, with two-thirds from Caucasian backgrounds. Differences in diploma types between groups were statistically significant for the urban sub-group where 96% of the Tech-Prep group had local diplomas compared to 89% of the non-Tech-Prep's ($\chi^2 = 4.16$; $p < ,05$). Ethnicity was also significant for the urban sub-group (77% to 62%; $\chi^2 = 6.19$; $p < .02$). Both of the ethnicity and diploma type factors may be expected to provide an advantage for the non-Tech-Prep group relative to the Tech-Prep student academic performance.

TABLE 3

DEMOGRAPHIC CHARACTERISTICS OF ALL 1999 STUDY PARTICIPANTS

Characteristic Variable	Tech-Prep Students	Non-Tech-Prep Students	Total Students
Gender:	N = 255	N = 136	N = 391
Male	149 (58%)	74 (54%)	223 (57%)
Female	106 (42%)	62 (46%)	168 (43%)
Minority Status:	N = 251	N = 120	N = 371
White	94 (37%)	77 (64%)	171 (46%)
Non-White	157 (63%)	43 (36%)	200 (54%)
HS Diploma Type:	N = 255	N = 136	N = 391
Regents Diploma	44 (17%)	31 (23%)	75 (19%)
Local Diploma	211 (83%)	105 (77%)	316 (81%)

Status of All Students in College

Comparisons are shown in Table 4 for the total sample of students who had participated in Tech-Prep during high school and their non-Tech-Prep peers who were enrolled in the same paired colleges. Analyses using all students suggest that Tech-Prep students were statistically more likely than their non-Tech-Prep peers to persist at the paired college (72% to 58%) and therefore drop out less frequently (28% to 41%; $\chi^2 = 7.45$, $p < .01$). There were no differences between the groups in the proportion who were required to complete remediation courses (52% to 53%).

With regard to areas of study, it appears that in college most Tech-Prep students complete a course of study that is similar to the area of interest in which they were enrolled while in high school. For 59% of Tech-Prep students the college curriculum in which they were enrolled matched their high school Tech-Prep curriculum and for an additional 4% there was a partial match. The large proportion indicated as "Unsure if Matches" (19%) was due to on-site data gatherers who were unfamiliar with the individual student's high school and/or college program.

Tech-Prep college students statistically tended to enroll more often in career curricula than non-Tech-Prep students (77% to 65%; $\chi^2 = 6.89$, $p < .01$), where those registered in "Liberal Arts & Sciences" and "Other" (mostly undeclared majors) were not considered to be in a career program. Almost half of the Tech-Prep students enrolled in the more demanding "Engineering-Related" and "Health-Related" curricula (34% + 11% = 45%), compared to less than one-third of non-Tech-Prep students who enrolled in those programs (24% + 7% = 31%).

It is interesting to note that the smallest proportion of Tech-Prep students were enrolled in trade & industrial and human services career programs. Critics of Tech-Prep have often stated that Tech-Prep is detrimental to the educational and career attainment of urban and minority students, specifically because it can serve as a means for derailing students away from rigorous college-preparatory courses. It has been argued that Tech-Prep programs "track" students into low status, low paying positions within the trade and industrial and human services fields. Our findings regarding Tech-Prep students' career options contradict those beliefs. Furthermore, both Tech-Prep and non-Tech-Prep students tend to maintain their interest in their original college curriculum choices throughout their enrollment in college (83% and 90%, respectively), although of the few that did change curricula, Tech-Prep students did so more often ($\chi^2 = 4.41$; $p < .05$).

At the time this study was conducted, 57% of the students sampled had been out of high school for over two years and, thus, were presumed to have completed at least two years of college. An important question to ask to measure the effectiveness of Tech-Prep is whether participation in the program impacts students' readiness to attend college. To answer this question, analysis of variance was conducted to investigate differences in the grade point averages achieved by Tech-Prep and non-Tech-Prep students during semesters one through four of college.

The mean grade point averages of all study participants are presented in Table 5. The students included in this study were at different phases of their college educations. While some study participants had already graduated from college, some had dropped out, and many were completing either their first, second, third, or fourth semester of college. To obtain a better profile of those students who remained in college compared with those who dropped out prior to completing their associate degree, Table 5 presents data separately by the number of semesters completed by students.

To understand how to read the data in Table 5, note the following example.

The group of Tech-Prep students who completed 4 semesters, had a mean GPA of 2.58 when they were in their first semester. When that same group attended their second semester, their mean GPA was 2.62. They had mean GPA's of 2.34 and 2,56 in their third and fourth semesters, respectively. Note also that those who graduated had higher average semester GPA's at all levels than other students.

TABLE 4

STATUS OF TECH-PREP AND NON-TECH-PREP STUDENTS IN COLLEGE ALL DIPLOMA TYPES

Status Variable	Tech-Prep Students	Non-Tech-Prep Students
College Status	N = 254	N = 135
Currently Enrolled In College	158 (62%)	73 (54%)
Graduated from College	26 (10%)	6 (4%)
Dropped Out of College	70 (28%)	56 (41%)
Remediation Needs	N = 255	N = 136
Remediation Required	133 (52%)	72 (53%)
Remediation Not Required	122 (48%)	64 (47%)
Original College Curriculum/Area of Interest	N = 255	N = 136
Business-Related	64 (25%)	38 (28%)
Engineering-Related	87 (34%)	33 (24%)
Health-Related	28 (11%)	9 (7%)
Liberal Arts and Sciences	45 (18%)	36 (26%)
Criminal Justice & Legal Studies	9 (4%)	5 (4%)
Trade & Industrial	5 (2%)	1 (1%)
Human Services	4 (2%)	2 (1%)
Other or No Declared Major	13 (5%)	12 (9%)
Does Curriculum Match High School Tech-Prep Curriculum	N = 253	No Data
Curriculum Matches	150 (59%)	
Curriculum Does Not Match	46 (18%)	
Partially Matches	10 (4%)	
Unsure if Matches	47 (19%)	
Did Student Change Curriculum While in College	N = 255	N = 136
Student Changed Curriculum	44 (17%)	13 (10%)
Student Did Not Change Curriculum	211 (83%)	123 (90%)

The mean first semester GPA's for all Tech-Prep students was 2.21 compared to 1.86 for non-Tech-Prep students. A series of one-way analyses of variance show that during the first semester of college Tech-prep students achieve significantly higher semester averages than their non-Tech-Prep peers ($F_{(1,391)} = 5.31$, $p = .02$). In spite of the ethnic and diploma type performance factors mentioned above, Tech-Prep students seem to be better prepared to begin college-level work than their non-Tech-Prep counterparts.

A higher proportion of Tech-Prep than non-Tech-Prep students completed 4 or more semesters (26% to 13%; $\chi^2 = 9.50$, $p < .01$). In addition, more Tech-Prep students graduated (10% to 4%). These results are considered preliminary since it will require another two years before the student numbers in Tech-Prep reach steady state. One-way analyses of variance suggest that Tech-Prep and non-Tech-Prep student cohorts achieve similar grade point averages during their second, third, and fourth semesters in college.

A comparison of GPA's across the various semesters seems to show that students with the lowest GPA's in each semester are least likely to complete subsequent semesters. One should keep in mind that 28% of Tech-Prep and 41% of non-Tech-Prep students had dropped out (Table 4). It is probable that the bulk of drop-outs occurred in the first year of college.

TABLE 5

MEAN GRADE POINT AVERAGES BY COLLEGE SEMESTER COMPLETED
ALL DIPLOMA TYPES

	Tech-Prep Students			Non-Tech-Prep Students		
Semester & Cohort	GPA	N	%	GPA	N	%
Semester 1 GPA's:						
All Enrolled in 1st Semester	2.21	255	100	1.86	136	100
Completed Only 1 Semester	1.98	105	41	1.74	63	46
Completed 2 Semesters	2.37	37	15	1.69	18	13
Completed 3 Semesters	2.17	46	18	2.38	31	23
Completed 4 Semesters	2.58	67	26	2.94	18	13
Graduated	2.88	26	10	3.55	6	4
Semester 2 GPA's:						
Completed 2 Semesters	1.82	37		1.52	18	
Completed 3 Semesters	2.12	46		2.23	31	
Completed 4 Semesters	2.62	67		2.63	18	
Graduated	2.91	26		3.18	6	
Semester 3 GPA's:						
Completed 3 Semesters	1.01	46		1.91	31	
Completed 4 Semesters	2.34	67		2.67	18	
Graduated	2.69	26		3.43	6	
Semester 4 GPA's:						
Completed 4 Semesters	2.56	67		2.33	18	
Graduated	2.90	26		3.18	6	

Status of Local High School Diploma Recipients in College

Analyses of data from local diploma students shown in Table 6 were similar to those for all study participants. That is, Tech-Prep students were more likely to persist at the paired college (69% to 55%) and dropped out less often (32% to 45%; $\chi^2 = 5.01$, $p < .05$. They also graduated more often (10% to 2%) than their peers. Both groups were equally likely to require remediation (60% to 62%). Local diploma Tech-Prep students exhibited mostly similar curricular preferences as the general sample (shown in Table 4), choosing career programs more often, 77% to 67%.

TABLE 6

STATUS OF TECH-PREP AND NON-TECH-PREP STUDENTS IN COLLEGE
LOCAL DIPLOMA STUDENTS

Status Variable	Tech-Prep Students	Non-Tech-Prep Students
College Status	N = 210	N = 105
Currently Enrolled In College	123 (59%)	56 (53%)
Graduated from College	20 (10%)	2 (2%)
Dropped Out of College	67 (32%)	47 (45%)
Remediation Needs	N = 211	N = 105
Remediation Required	127 (60%)	65 (62%)
Remediation Not Required	84 (40%)	40 (38%)
Original College Curriculum/Area of Interest	N = 211	N = 105
Business-Related	50 (24%)	28 (27%)
Engineering-Related	75 (36%)	26 (25%)
Health-Related	24 (11%)	9 (9%)
Liberal Arts and Sciences	38 (18%)	25 (24%)
Criminal Justice & Legal Studies	6 (3%)	5 (5%)
Trade & Industrial	3 (1%)	1 (1%)
Human Services	4 (2%)	1 (1%)
Other or No Declared Major	11 (5%)	10 (10%)
Does Curriculum Match High School Tech-Prep Curriculum	N = 210	No Data
Curriculum Matches	126 (60%)	
Curriculum Does Not Match	36 (17%)	
Partially Matches	9 (4%)	
Unsure if Matches	39 (19%)	
Did Student Change Curriculum While in College	N = 211	N = 105
Student Changed Curriculum	36 (17%)	12 (11%)
Student Did Not Change Curriculum	175 (83%)	93 (89%)

The mean first semester GPA's for high school local diploma Tech-Prep students of 2.14 was significantly higher than the 1.74 for non-Tech-Prep local diploma recipients, as shown in Table 7. A significantly higher proportion of these Tech-Prep students completed four semesters than their non-Tech-Prep peers (25% to 9%; $\chi^2 = 11.13$; $p < .01$) and a higher proportion graduated (9% to 2%). Once again, these results are considered preliminary until the Tech-Prep numbers at each level stabilize. The results for local diploma students shown in Tables 6 and 7 are quite similar to those shown for all participants in Tables 4 and 5 because 83% of the Tech-Prep participants hold local diplomas as do 77% of their non-Tech-Prep counterparts. Local diploma Tech-Prep students were more often enrolled in urban colleges (79% to 70%; $\chi^2 = 3.84$; $p < .05$).

TABLE 7

MEAN GRADE POINT AVERAGES BY COLLEGE SEMESTER COMPLETED
LOCAL DIPLOMA STUDENTS

	Tech-Prep Students			Non-Tech-Prep Students		
Semester & Cohort	GPA	N	%	GPA	N	%
Semester 1 GPA's:						
All Enrolled	2.14	211	100	1.74	105	100
Completed Only 1 Semester	1.92	86	41	1.65	54	51
Completed 2 Semesters	2.27	31	15	1.49	14	13
Completed 3 Semesters	2.15	34	16	2.26	21	20
Completed 4 Semesters	2.61	52	25	2.86	9	9
Graduated	2.97	20	9	*	2	2
Semester 2 GPA's:						
Completed 2 Semesters	1.78	31		1.35	14	
Completed 3 Semesters	2.08	34		2.19	21	
Completed 4 Semesters	2.66	52		2.47	9	
Graduated	2.97	20		*	2	
Semester 3 GPA's:						
Completed 3 Semesters	1.83	34		1.86	21	
Completed 4 Semesters	2.35	52		2.53	9	
Graduated	2.71	20		*	2	
Semester 4 GPA's:						
Completed 4 Semesters	2.47	52		2.38	9	
Graduated	2.88	20		*	2	

* Mean not calculated due to too few cases.

Status of Regents Diploma Recipients in College

There were only 74 study participants who held high school Regents diplomas which were awarded to graduates who passed special (Regents) exams in a variety of subject areas. Others could earn local diplomas by passing less demanding Regents Competency Tests in fewer subject areas. In Table 8, statistically higher proportions of Tech-Prep students persist in college (94%

TABLE 8

STATUS OF TECH-PREP AND NON-TECH-PREP STUDENTS IN COLLEGE
REGENTS DIPLOMA STUDENTS

Status Variable	Tech-Prep Students	Non-Tech-Prep Students
College Status	N = 44	N = 30
Currently Enrolled In College	35 (80%)	17 (57%)
Graduated from College	6 (14%)	4 (13%)
Dropped Out of College	3 (7%)	9 (30%)
Remediation Needs	N = 44	N = 31
Remediation Required	7 (16%)	7 (23%)
Remediation Not Required	37 (84%)	24 (77%)
Original College Curriculum/Area of Interest	N = 44	N = 31
Business-Related	14 (32%)	10 (32%)
Engineering-Related	12 (27%)	7 (23%)
Health-Related	4 (9%)	0 (0%)
Liberal Arts and Sciences	7 (16%)	11 (35%)
Criminal Justice & Legal Studies	3 (7%)	0 (0%)
Trade & Industrial	2 (4%)	0 (0%)
Human Services	0 (0%)	1 (3%)
Other or No Declared Major	2 (4%)	2 (6%)
Does Curriculum Match High School Tech-Prep Curriculum	N = 43	No Data
Curriculum Matches	24 (56%)	
Curriculum Does Not Match	10 (23%)	
Partially Matches	1 (2%)	
Unsure if Matches	8 (19%)	
Did Student Change Curriculum While in College	N = 44	N = 31
Student Changed Curriculum	6 (14%)	1 (3%)
Student Did Not Change Curriculum	38 (86%)	30 (97%)

to 70%) and fewer drop-out (7% to 30%; $\chi^2 = 6.56$, $p = .02$) than non-Tech-Prep Regents diploma recipients. Fewer non-Tech-Prep Regents students chose career college curricula than Tech-Prep Regents students (59% to 80%; $\chi^2 = 4.26$, $p = .05$). This result is not surprising since the Regents curriculum is usually designated as a standard "college prep" course of study with little or no career orientation. Tech-Prep programs include a career orientation and exploration which may result in more frequent selection of college career curricula.

Table 9 shows that the Regents diploma students tend to have similar GPA's and persistence rates whether they are in the Tech-Prep or non-Tech-Prep group. These students appear to be quite capable academically at the associate degree level, which may be predictable in that they have earned Regents diplomas by passing substantial examinations in English, mathematics, sciences, western and global history, and foreign language. Briefly stated, the Regents diploma pattern is the college preparatory program with most such students opting for direct entry into senior colleges.

TABLE 9

MEAN GRADE POINT AVERAGES BY COLLEGE SEMESTER COMPLETED
REGENTS DIPLOMA STUDENTS

	Tech-Prep Students			Non-Tech-Prep Students		
Semester & Cohort	GPA	N	%	GPA	N	%
Semester 1 GPA's:						
All Enrolled in 1st Semester	2.50	44	100	2.69	31	100
Completed Only 1 Semester	2.58	11	25	2.56	8	26
Completed 2 Semesters	2.91	6	14	2.40	4	13
Completed 3 Semesters	2.21	12	27	2.62	10	32
Completed 4 Semesters	2.47	14	32	3.02	9	29
Graduated	2.92	6	14	3.62	4	13
Semester 2 GPA's:						
Completed 2 Semesters	2.02	6		2.10	4	
Completed 3 Semesters	2.23	12		2.28	10	
Completed 4 Semesters	2.47	14		2.79	9	
Graduated	2.73	6		3.33	4	
Semester 3 GPA's:						
Completed 3 Semesters	2.38	12		2.04	10	
Completed 4 Semesters	2.33	14		2.82	9	
Graduated	2.46	6		3.44	4	
Semester 4 GPA's:						
Completed 4 Semesters	2.84	14		2.54	9	
Graduated	3.07	6		3.14	4	

SUMMARY

Fourteen pairs of institutions in different Tech-Prep consortia provided data for this College Pairs Study. Of the 1,854 students in the earlier Pairs Study data base, 391 (21%) had enrolled in the paired colleges. There was no attempt to follow the remainder of the initial data base population, who may have chosen to attend other colleges. enter the armed forces, engage in full-time employment, serve in the Peace Corps., or taken other options.

The two groups in the College Pairs sample were statistically equated based on 9th and 10th grade high school averages and appeared to be representative of the initial 1997 data base in that both exhibited similar patterns of regression coefficients and significance on the 12 high school variables as shown in Table 1. While the Tech-Prep group showed significantly higher cumulative high school averages, the difference was small indicating that the effects of Tech-Prep were just beginning to materialize and that the current sample groups were substantially equal in high school performance. This also indicates that the comparison between the Tech-Prep and non-Tech-Prep groups is valid and that significant differences which appear in college may be attributed to the Tech-Prep experience.

Table 10 summarizes the findings for variables which exhibited statistical significance and whether they provided an apparent advantage to either the experimental (Tech-Prep) or control (non-Tech-Prep) group. The table includes information for the entire sample (all students) and for the local diploma and Regents diploma sub-groups.

Note that there was a much larger difference in ethnicity between the Tech-Prep and non-Tech-Prep groups than in the initial data base. Here, about two-thirds of the Tech-Prep's were minorities while only one-third of the non-Tech-Prep's were minorities. This difference was due to the significantly larger proportion of urban students in the Tech-Prep group and a correspondingly larger proportion of local diploma holders among the Tech-Prep's. These variables tended to provide an initial advantage to the non-Tech-Prep group, which also included a larger proportion of Regents diploma recipients.

Tech-Prep students persisted more and dropped-out less than their non-Tech-Prep peers. This finding was statistically significant for the entire sample, for local diploma holders and for Regents diploma recipients. The total sample of Tech-Prep students had significantly higher mean first semester grade-point-averages than the non-Tech-Prep students. Tech-Prep students completed 4 or more semesters of college work significantly more often than their non-Tech-Prep peers. These last two academic variables were also statistically significant for the Tech-Prep local diploma recipient sub-group.

Tech-Prep students and their Regents diploma sub-group tended to enroll in career college curricula more frequently than non-Tech-Prep students. In addition, Tech-Prep students enrolled in the more rigorous "Engineering-Related" and "Health-Related" curricula more often than their non-Tech-Prep perrs and correspondingly Tech-Prep students enrolled less often in less academically demanding "Trade & Industrial" and "Human Services" programs. While small proportions of students changed curricula in colleges, the Tech-Prep students as a whole did so more often.

TABLE 10

STATISTICAL SIGNIFICANCE OF SELECTED VARIABLES
AND THEIR AFFECT ON TECH-PREP AND NON-TECH-PREP GROUPS

Variable	Advantage To: Tech-Prep	Advantage To: Non-Tech-Prep
Urban Consortia		
-- All Students		*
-- Local Diplomas		*
Minority Status		
-- All Students		*
-- Urban Consortia		*
HS Diploma Type		
-- Urban Consortia		*
Persistence/Drop-Out		
-- All Students	*	
-- Local Diplomas	*	
-- Regents Diplomas	*	
Career Curricula		
-- All Students	*	
-- More Demanding Curricula	*	
-- Regents Diplomas	*	
Change Curricula		
-- All Students		*
1st Semester GPA		
-- All Students	*	
-- Local Diplomas	*	
Completed 4 Semesters		
-- All Students	*	
-- Local Diplomas	*	

* Indicates statistical significance at $p < .05$ level or better.

CONCLUSIONS

The positive effects of the Tech-Prep program are most evident in the academic performance of the Tech-Prep group compared to their non-Tech-Prep peers. This is most apparent in their significantly higher persistence and lower drop-out rates. This result applied to the total sample as well as both the local diploma holders and the Regents diploma group. In addition, the total Tech-Prep group and the Tech-Prep local diploma recipients had higher first semester mean grade-point averages than their non-Tech-Prep counterparts and tended to complete four or more college semesters more often than their peers.

Since the Tech-Prep program usually includes real-world problem-solving and workplace learning experiences, it is no surprise that the total sample of Tech-Prepers opted for college career curricula more often that their non-Tech-Prep peers who may not have benefitted from the same career information. This factor evidently influenced the Regents diploma group who also showed the college career curricula advantage and the local diploma group whose 77% to 67% advantage just missed statistical significance.

While this study appears to show that Tech-Prep has an impact on both local diploma students and Regents diploma students, the former group seems to benefit more from this program. That is, students who are somewhat weaker academically tend to do better in college by scoring higher GPA's and dropping out less frequently as a result of their Tech-Prep experiences than their counterparts. Regents level students also show some similar effects although the Regents student sample is too small to produce definitive conclusions.

RECOMMENDATIONS

This study supports the position that Tech-Prep tends to reinforce both the academic and career orientation of a significant numbers of students. The effort to date in New York State has been to demonstrate this program as a viable model for potential educational reform. It would seem appropriate to greatly increase access to Tech-Prep for many more students. This can be done by official statewide recognition and funding a substantial expansion of the program with appropriate monitoring to maintain quality.

The connection to career-oriented associate degree programs which generally lead to upward mobile semi-professional careers will continue to be an accessible match for many young people. Tech-Prep helps to prepare students to enter those college programs with a better chance of success than otherwise would be the case. Often times, students in associate degree curricula find that they develop confidence in their ability to succeed and revise their aspirations to further formal education either full-time or in conjunction with employment using their associate degree skills. This unique high school-college continuum needs to be studied further to improve its efficiency and holding power.

The results found here for required remediation are disappointing. Individual consortia have shown that substantial gains can be made in reducing the need for college remediation by more concentrated effort during the Tech-Prep high school phase. However, the total sample and diploma type sub-groups showed literally no effect on required remediation between the Tech-Prep and non-Tech-Prep counterpart groups. There should be a clearly stated objective with appropriate incentives for consortia to focus attention on this important factor which, left undone, will probably reduce both access and success in college.

Tech-Prep does not purport to be the answer for every student, although the career information and workplace experiences might be a useful element for infusion into most students' development.

CLOSURE

New York State has studied its Tech-Prep program over the past three years and a great deal of important information has been elicited and disseminated through several publications, this one being the last in the current series. The authors of this and the earlier studies believe it is time for decision-makers to act on this information. Tech-Prep seems to be a valuable resource as a potential element in reforming the state's total educational effort to serve students better in the future and prepare them for the new and more demanding occupations which will require the combinations of intellectual and pragmatic know-how found in many existing and emerging associate degree career curricula.

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